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THE OSPREY

AN ILLUSTRATED MONTHLY MAGAZINE of BIRDS & NATURE

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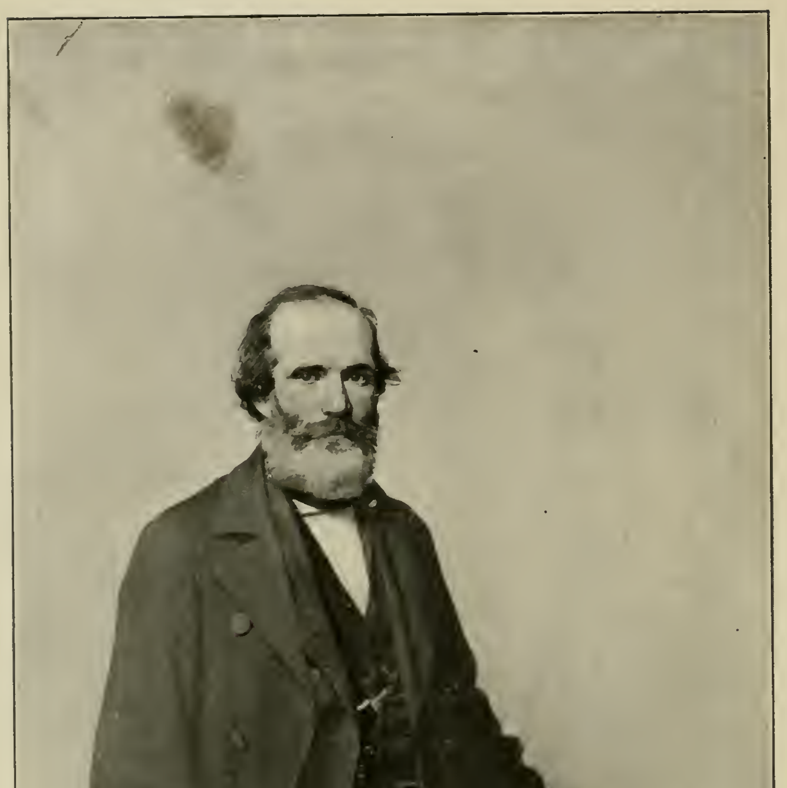

JOHN CASSIN.

THE OSPREY.

An Illustrated Magazine of Popular Ornithology.

Published Monthly.

VOLUME I. (New Series). MAY, 1902. NUMBER 5.

WINTER WATER FOWL OF THE DES MOINES RAPIDS.

By Ed. S. CURRIER, KEOKUK, IOWA.

I live on the bank of the Mississippi River, at the foot of seven miles of shallow, swift-running water, broken by projecting ledges of limestone called the Des Moines Rapids.

The river has cut its way through earth and rock and flows between rather abrupt bluffs, which rise to a height of about two hundred feet on either side, and are about one mile apart.

Even in the most severe winters these rapids never entirely freeze over; intervals occur that are locally called ''air-holes'', or open fields of water of irregular size and shape. During the coldest periods the air-holes contract by the formation of new ice, and some of the smaller ones disappear entirely, but with a milder spell of weather they are enlarged by the melting and wearing away of the ice.

In severe weather these places will be the only open water for many miles, for weeks and even months at a stretch.

Here is where thousands of the Golden-eyes (*Clangula clangula americana*) spend the months of December, January, February, and part of March every year. The colder and longer the winter the greater their numbers.

An occasional Barrow's Golden-eye (*Clangula islandica*) is found with them, but this is not often.

The Golden-eyes begin to appear here late in November with the last flight of Mallards, Teals and Blue-bills. They are very quiet then, and keep well out in the stream. Not until a severe cold wave, usually in December, that sends the mercury down near the zero mark, or below, and closes the river tightly north and south of us, do they come in full numbers.

Then as the open water narrows, and limits their feeding ground, they are brought together in great flocks. In the early winter they have an occasional Mallard, (*Anas boschas*), Teal, (*Nettion carolinensis*), Hooded Merganser, (*Lophodytes cucullatus*), or Blue-bill, (*Aythya affinis*), for company; but after winter sets in, in earnest, only the hardy Canada Geese (*Branta canadensis*), and a few Gulls (*Larus argentatus smithsonianus*), are left with them.

An occasional squad of Crows (*Corvus americanus*) will drop down on the ice around an air-hole, while going to or from their great roost on the Illinois side, but all other land birds seem to shun the ice-covered river.

The Golden-eyes are very playful, and, as spring approaches, noisy. The swift current is constantly forcing them towards the ice at the lower end of the pool, so that they are obliged to take wing and go to the other end of the air-hole frequently. They rise on rapidly beating wings, the clear whistling ringing across the dark water and white ice-fields, and scurrying up stream in irregular groups, drop in again with a noisy splash. This drifting down, and flying back again, seems to be enjoyed as much by the ducks, as is coasting by the children.

Each group of arrivals is received with many bows, and much flapping of wings by the ones on the water, and the penetrating cry of the drakes "speer" "speer" reaches to a great distance. It is a scene of great activity from daylight until darkness sets in, and makes winter less dreary to the birds of this locality.

With the mercury at zero, a stiff breeze from the northwest, and the cold sun shining on each duck, showing the conspicuous white marking against the black water, the playing and feeding goes merrily on.

The bright sun glancing on the white markings make the bird look entirely white at a distance, but as the duck changes position, with the dark color towards the sun, it seems to have mysteriously disappeared, as it does not show on the black water.

In diving it is the same: a bird will go under seeming all white to suddenly appear at a short distance all black.

With a large flock in motion on the water, on a sunny day, you have a pleasant sight.

On stormy days they are rather silent, keeping in more compact flocks, and moving around very little.

The greatest movements take place about sundown, when they all head for a favorite air-hole, (usually the largest), on whirring wings. Here they settle in with much bustle and confusion, playing and feeding until darkness sets in. They spend a great part of the night on thin, new ice at the edge of the open water. As a rule, unless migration is on, or the ice is running, there is little movement during the night; but frequently you hear the noisy whistling of the wings of some belated or disturbed bird, soon followed by the distinct splash as it strikes the water again.

As winter abates and the increasing warmth causes the ice to give way, followed by the great break-up as the ice goes out, the duck is at its best. The moving ice fields then keep them on the watch, and as the open water they are in narrows, they spring up and fly over the grinding, churning mass, drop into the next clear space up stream.

The instant they hit the water they go to playing, chasing each other, and diving to great distances. At times a part of the flock will rise and depart for some distant open water, soon followed by others, and then perhaps by the remainder, and that particular place will be deserted by them for the time being.

Again they will congregate in an open space, with the ice rumbling and roaring around them on all sides, seemingly loath to leave, but when another change takes place in the ice, and a block sweeps towards them, they are forced to leave.

At times they get a long respite, and are left undisturbed in an open space, by an ice jam forming above them on the rapids. Then, again, the ice may break up so that the surface of the river is almost completely covered, and they can find open water only by a long flight up or down stream, or in some bend where a projecting head-land shunts the ice out into the stream. This does not often happen and is caused by an ice jam forming at the mouth of the Des Moines River a few miles below.

If the great break-up of the ice comes late in the season, as the first week in March, which often happens after a severe winter, we find the eager Sprigtails (*Dafila acuta*), and the first flight of Mallards coming up, and then there is bird-life worth seeing. Although the number of ducks that pass here is rapidly falling off, still thousands are left.

The first flight of Pin-tails is with us the greatest, and they always appear while the ice is running. Several days before the ice gives way an occasional flock will come up and circle around over the frozen river as if taking observations, and then disappear to the South. If a rain comes before the ice goes out, and forms pools in the bottom-land corn fields, they will settle in these until the rivers open, or a cold wave strikes us.

The first night after the ice has commenced moving is a busy and exciting one for the water birds. It is usually a misty, rainy night, which together with a low, steady wind from the southwest fast rots the ice. Standing on the bank of the river, and down near the water, one can tell fairly well what is taking place by the sounds that echo across the great stream. Everything will be dripping wet and the air has that clammy feeling which always accompanies a great thaw. The river will be on the rise and the ice cakes can be seen swiftly running in the semi-darkness.

The first sounds noticed from the river are caused by the ice and water in commotion. The low ''swishing'' noise of the warm slush ice along shore is drowned by the deeper reports and rumblings of the real movements out in the current of the stream. Great fields of solid ice are being crushed to pieces against piles of the same, caught and anchored fast to a rocky projection. The crunching and grinding of the ice cakes is the loudest noise, but you can plainly hear the voices and wing-beats of the water fowl.

The whistling noise made by the Golden-eye wings is constant as they are now scattered, the flocks broken and each bird for itself. The "spur'' ''spur'' comes across the water frequently though, and the deep ''honking'' of Canada Geese, either passing over head or complaining at being forced to take wing because the cake they were drifting on has collided, or been crushed. In the air above, and low near the river's surface, you can distinguish the barking notes of the passing flocks of Pin-tails; at intervals the deep ''quack-quack'' of a startled Mallard reaches you; frequently the pleasant whistling notes of the Green-winged Teal, accompanied by the nasal ''quack, quack, quack'' of an excited drake of the same species comes to you.

Every crash of the contending ice fields is preceded, and followed, by great confusion; first, the muffled roar of the wings as the birds rise from the water; then the crushing, rending noise of the breaking ice; and then, as the ducks scatter out, you can realize the different species passing nearby, by the noise from the wings. The heavy beat, accompanied by the low whistling heard if very near, of the Mallard wings, cannot be mistaken, any more than can the rapid humming of the Teals. Louder though than all others and throwing an echo from the opposite bluff—never totally absent from your hearing—is the clear whistling of the Golden-eye wings.

Occasionally the dim white shape of a gull appears with steady wing beats, which give out no noise; appearing and disappearing in a silent, ghostly manner.

The Golden-eye is known to the gunners here by the name of '' whistler.'' This is the most generally used name, but they are sometimes called ''winter ducks,'' and again ''fish ducks.'' The last title confuses them with the Shell-drakes or Mergansers, and as the flesh of the Golden-eye is not bad the name is hardly deserved. I have killed many here during the winter and early spring, and have never found one unfit for food. Of course though, I do not mean to say that they can be compared to the Mallard or Teal in this respect. Being heavy fliers, they are not hard to hit on the wing, but are very tenacious of life and hard to kill. If wounded, they fall into the water and dive to such distances that it requires lots of work and good eyes to get another shot.

A peculiar habit they have is when a flock is suddenly startled while in a air hole, as by the near by discharge of a gun, they do not all rise from the water at once; many of the birds will dive instead and then spring out of the water singly like quail flushing from the grass. They seem to come to the surface flying as if they had been on the wing below.

Hunting the Golden-eye is rather a dangerous pastime on account of the surroundings.

A boat is out of the question in most cases, as you cannot get it from one air hole to another. Working around the open water on the treacherous ice, particularly if there is a fresh snow, with that swift current underneath is sport that few care to indulge in. The shooting is generally done by the gunner from a blind of ice cakes placed near the open water. Some times the hunter takes a sheet, or other similar covering which will conceal him on the snow, and lies down on the ice between two air holes, shooting as the birds pass from one to the other. When the ice is running heavy is another dangerous time. If in a boat the hunter is compelled to watch constantly to prevent getting caught between the heavy fields. The wind may change, or freshen, and start a floe that has been held for a long time, and if the hunter is shut off from shore, it requires skillful manœuvering upon his part to reach a safe place. At times he is compelled to get upon the moving ice or in below an ice pile that is fast to the bottom.

Upon the whole, hunting Whistlers is not very satisfactory sport here.

The majority of the Golden-eyes leave here with the melting of the ice and opening of the river above and they are scarce after the middle of March. The 8th of April is the latest I have any record of here. They and the Canada Geese seem to delight in being with the running ice and follow it.

The railway and wagon bridge across the Mississippi here, is just at the foot of the Rapids, and has an effect that is peculiar upon the movements of the water birds. Not even the coots or grebes will allow the current to carry them underneath the bridge. They will come only so near, fighting against the stream all they can, finally giving it up and flying away up stream.

The ducks and geese will not come as far down, but near enough at times that you can distinguish the colors with the naked eye. The Blue-winged Teals (*Querquedula disciors*), and Lesser Scaup (*Aythya affinis*), are the boldest in this respect.

In their flight it is the same—very few will pass over the bridge, the flocks will make a wide detour at one end or the other, even passing over the city, instead of over the bridge. Occasionally though a single duck, or small flock, will tower to a great height and go over. I think the canvas-back and Red-head are more apt to do this than any other species.

THE DESTRUCTION OF BIRDS BY LIGHTHOUSES.

By Bernard J. Bretherton, U. S. Lighthouse Service.

The destruction of birds by lighthouses has formed the theme of more than one newspaper article of the sensational type, but as far as the writer's knowledge goes the subject has yet to be treated in a more sober vein, and it will be my endeavor to show in this paper that there are other sides to the question.

First, it should be remembered that the whole coast-line of the United States, every harbor-mouth, dangerous rock, outlaying island and prominent headland, is marked and guarded by a lighthouse, and as nearly all these are in the direct line taken by the birds in their migratory flights the wonder is that so few are killed.

For the same reason it will be seen that on account of their geographical position some light houses are more destructive than others to bird life.

There are two generally accepted ideas as to why birds are killed by lighthouses. Ono is that they are attracted to the light after the manner of moths; and another is that they are dashed against the lantern in stormy weather. The first of these is partly true but the second is entirely erroneous.

Birds seldom come to the light when the atmosphere is clear and the light can be seen for a long distance, but in calm foggy weather there are always birds either striking the light or flying around it; generally both.

This would point to the conclusion that they are not attracted by the light, yet on the other hand I have known of instances where small bands of certain species have remained in the neighborhood several days and come to the light every night leaving one or more dead behind each morning, but this has always happened in hazy weather. One particular instance of this kind excited my sympathy. It was the case of seven little Phalaropes. There might have been more of them when ill fate brought them to Cape Fowlweather, but they were a merry little band of seven when I first knew them.

I noticed them one day swimming about in a small pool left by the receding tide. There were four old birds and three young ones, and they seemed to be enjoying life as they bobbed about pecking at invisible atoms on the placid surface of that sunlit pool. But the sun heats the earth and the night cools it, and the river mouths belch forth great banks of summer fog bringing danger and destruction to our little feathered friends.

That night two young Phalaropes were killed on the lantern, and next day I went to the pool again; five of the birds were there but two of the immature ones were missing. And so it went on for about a week; in the daytime they would resort to the same pool to feed and at night they would fly around the light striking against it, not always with sufficient force to kill themselves, but steadily the merry party in the pool decreased till only one was left. Then one morning he was not there. Six of them reposed in my cabinet, the light-house cat having picked up the seventh.

During gales or extremely stormy weather birds do not, to my knowledge, fly over the ocean, and if they are blown off the land they are speedily beaten down into the sea and drowned.

Even the most typical ocean birds succumb to the violence of the elements at such times as is fully attested by the numbers of dead Petrels to be found on the beach after every winter storm.

Now having stated that birds are neither hurled against the light by the wind nor attracted by its brilliancy it remains for me to show how they do meet their death, but first it is necessary to explain the general construction of light-houses or that part of their construction which bears on this subject.

Light-houses vary considerably in their appearance, but all of them have a tower upon which the light is displayed. This tower may be a separate structure by itself or it may rise out of the roof of the keeper's dwelling. It may be round or square, tall or short, but with very few exceptions it is painted white. The tower is surmounted by an octagon structure of glass and iron known as the "lantern," inside of which is the illuminating apparatus. All around on the outside of the lantern runs an iron balcony three feet wide and on the outer edge of this balcony is an iron balustrade about three and a half feet high. Some of the large lights have a second balcony about ten feet below the first and the intervening space is sheeted with iron and known as the "drum". All this iron, including the drum, is painted black, and when the light is in operation on dark nights at two hundred yards distant the white painted tower is indistinctly visible, but the black upper-structure cannot be seen at all. This gives the light the appearance of being suspended in mid-air. This is just how the birds see it and there is no doubt in my mind but that they take it for the moon, a star, or other harmless heavenly body.

In the fog and darkness it is the only fixed point by which they can steer and so they fly toward it. If in doubt and uncertainty they hold their headlong course too long and in their last extremity try to save themselves by a rapid swerve to right or left they crash against the unseen iron balustrade; if they try to save themselves by a dive below the light they meet a more certain death against the invisible iron drum. This is how ninety per cent of the birds are killed, but for every one killed hundreds pass unharmed.

Once in a while a single bird, usually a duck, will crash straight through the glass. The rest of the birds killed belong to the famslies having slow and irregular flight such as the Finches, Warblers, and smaller Petrels.

Considering the large number of Finches that come to a light, but comparatively few of them are killed. As a general thing they do not strike the light with sufficient force to kill themselves and after fluttering up and down the glass for a while they will hop around the balcony two or three times and finally settle down on the sheltered side where they seem to enjoy the light and warmth till day breaks, and in this manner possibly thousands of birds are annually saved that, lost in the night, would have blown out over the sea until exhausted when they would have fallen into the water and drowned.

From the time that they first strike the glass with a little biff like a ball of cotton until they are released from their struggles by daylight or death the little warblers never cease their frantic fluttering up and down, and undoubtedly the most of them die of exhaustion or the nervous shock.

No birds are more persistent in their efforts at self destruction than the little Petrels, and yet so light and fairy like are they that I have never known one to be killed outright, but possibly many of them die later from their self-inflicted bruises. They are only seen around the light during the nesting season, and they undoubtedly come to the tower on their way to and from their nests, and like other birds they become confused in the fog and darkness.

Before closing I should state that at light-houses which have fog horns the destruction of birds is very light. A fact well known to light keepers is that more birds are killed by a newly erected light-house than an old one and that the number of birds killed decreases every year for the first few years that the light is in operation until, it might be said, to have reached its normal power of destruction, which may point to the supposition that birds are guided in their migrations as much by previous knowledge as by instinct and therefore learn to avoid a known danger.

A great Auk's Egg was sold in April and £252 was realized.

An egg of the great extinct Æpyornis of Madagascar was sold for £42; it was slightly cracked.

A mounted specimen of a great Auk was sold for £315, on the 17th of April, 1902, at the auction rooms of J. C. Stevens in London.

THE PORTO RICAN PEWEE (*BLACICUS BLANCOI*).

By B. S. Bowdish.

This bird is common in suitable localities in the western half of Porto Rico, but I did not observe it in Vieques nor in the vicinity of San Juan. About Mayaguez however it is fairly abundant, and once carefully observed is readily differentiated from the larger *Myiarchus antillarum*, even among the trees.

Its habits generally seem much like those of other flycatchers, and one is particularly reminded of *Empidonax virescens.*

The note is entirely unlike that of *Myiarchus*, differs from the note of *B. caribaeus* of Cuba, and is more like the "purring" note sometimes uttered by *Contopus virens.* It is a single prolonged note, once heard not to be confounded with that of any other bird I know. In general with most of the birds of this family the bird perches on some convenient twig, usually at an average height of fifteen or twenty feet, though not rarely in the tree tops, and from there launches forth on such prey as may appear, often returning to the same perch though less regular in this than many of the family. Sometimes it takes its prey in short straight-away dipping or rising flights instead of loops and continuing these flights in a given direction is soon far from its original hunting ground.

The coffee plantations are favorite resorts of this bird. It is also found on the hill-sides where a tangle of vine and second growth is studded here and there with the few remaining large trees.

The food though sometimes composed of wasps, small flies, etc., seems to be more largely made up of beetles, and a small steel-blue species about one-sixteenth of an inch in length appeared to be a favorite, judging from the number found in stomachs examined.

During the months of July and August, particularly the latter, the birds are moulting and in very poor plumage.

Like others of their family they are not at all shy and are usually readily approached and observed.

June 27th, 1901, I found a deserted nest which could hardly have belonged to any other species. It was situated in the tips of a crotch of a tree growing on a hillside in a coffee plantation, and was fifteen feet from the ground. It was built of fine, hair-like roots, green stringy moss, and two white flower petals, and was so frail and thin it could be seen through from below. It measured 3½ x 2 inches in diameter and 2 x 1¼ inches in depth. It contained one addled egg which measured 0.75 x 0.56 inches, light creamy ground dotted sparingly, chiefly about the large end with specks and dots of cinnamon and burnt umber and much resembled specimens of *Empidonax virescens.*

THE WORKS OF JOHN CASSIN.

By Theodore Gill.

In the March number of the Osprey (p. 50-53) was published a "Biographical Notice of John Cassin" by the present writer. In a new ornithological work (Cassinia), published a few days later, appeared another article on "John Cassin" by Mr. Witmer Stone of Philadelphia. Thus, after the neglect of a third of a century, Cassin has found two biographers within the limit of a week's time.

In the present article, it is only intended to notice the main features of Cassin's activity. Curiously enough, the first article (a "verbal communication") contributed by this man who devoted his future almost exclusively to ornithology, was of an entomological character, a notice of a supposed new race of "seventeen year locust", published in 1843 in the Proceedings of the Academy of Natural Sciences of Philadelphia (p. 279); this "locust" (*Cicada*) was soon afterwards named *Cicada cassini* by Dr. Fisher. The next year (1844) another "verbal communication" was made on the Snowy Owl (*Nyctea*).

The first entitled article was published in 1845, and then succeeded a long series continued nearly up to the time of his death. The articles appeared in the Proceedings and Journal of the Academy as follows:

	Proceedings.		Journal.
1843	0	(1)	0
1844	0	(1)	0
1845	0	(0)	0
1846	1	(0)	0
1847	4	(0)	1
1848	5	(1)	2
1849	4	(1)	1
1850	4	(0)	2
1851	7	(0)	0
1852	2	(2)	2
1853	2	(1)	1
1854	1	(1)	0
1855	3	(2)	2
1856	4	(4)	0
1857	0	(4)	0
1858	2	(4)	1
1859	3	(2)	0
1860	3	(2)	0
1861	0	(1)	0
1862	1	(2)	2
1863	3	(0)	1

1864	3	(3)	0
1865	3	(0)	0
1866	3	(2)	0
1867	3	(0)	0

In this summary are included six catalogues of birds in the Academy's Museum published, with special paginations, as appendices to the Proceedings, viz: Strigidæ (1848), Vulturidæ (1849), Caprimulgidæ (1851), Halcyonidæ (1852), Hirundinidæ (1853) and Falconidæ (1855). Including these there were 62 formally entitled articles in the Proceedings and 15 in the Journal; in addition there were published brief abstracts of 32 "verbal communications" or perfunctory resolutions, which have been enumerated within parentheses.

The catalogues will give some idea of Cassin's studies at various dates; but he did not confine himself to those families, but meanwhile described species of other groups. It is worth while to note that each of the catalogued families was divided into five subfamilies and thus was made manifest Cassin's leaning toward quinarianism; but he does not seem to have been shackled by too great faith in the idea of "representation" which vitiated Swainson's work.

The works published independently are as follows:

1.

Illustrations | of the | Birds of California, Texas, | and | British and Russian America. | Intended to comprise all the species of North America except Mexico, not figured by | former American authors, and to serve as | a supplement | to the octavo edition of | Audubon's Birds of America. | By | John Cassin, | ....and | Henry L. Stevens, | .... To be completed in thirty numbers, published monthly. | Philadelphia: | King & Baird, Printers, No. 9 Sanson Street. | 1852.

This was not extended beyond the first number and was suppressed. A note was published on this, "the so-called cancelled fasiculus of Cassin's Illustrations," by Mr. William J. Fox in "the *Auk*" for July, 1901 (p. 291-292). Mr. Fox observes "there is a copy of the fasciculus in the Library of the Academy of Natural Sciences of Philadelphia."

"From this it will be seen that not only is there a title, but its wording is quite different from Cassin's 'Illustration,' (1853-55); that the work has a joint authorship; and that the date of publication is 1852.

"The pages are numbered at the bottom, each species separately, *i. e.*, the text relating to the Mexican Jay in number 1-4, and the synopsis of the genus *Parus*, 1-5. In the later work six pages are devoted to the Mexican Jay, while the synopsis of the genus *Parus* is reduced to four, showing that the text was considerably changed in this issue.

"The earlier plates, five in all, are not numbered, and if numbered according to their insertion would compare as follows with those in the first part of the later work:

"*Cassin and Stevens, 1852.*	*Cassin, 1853.*
[1] Cyanocorax luxuosus (Lesson).	1. Cyanocorax luxuosus (Lesson).
[2] Melanerpes formicivorus (Swainson).	2. Melanerpes formicivorus (Swains).
[3] Chamæa fasciata (Gambel).	3. Lophophanes atricristatus (Cassin).
[4] Lophophanes atricristatus (Cassin).	4. Cyrtonyx Massena (Lesson).
[5] Cyrtonyx Massena (Lesson).	5. Larus Heermanni (Cassin).

"The present copy bears in pencil, in Cassin's handwriting, this note: 'Supplement number.' "

2.

Illustrations | of the | Birds | of | California, Texas, Oregon, British and | Russian America. | Intended to contain descriptions and figures | of all | North American Birds | not given by former American authors, | and a | General Synopsis of North American Ornithology. | By John Cassin, | Member of the Academy of Natural Sciences of Philadelphia; of the American Philosophical | Society; of the Horticultural Society of Pennsylvania; of the National Institute; | of the South Carolina Natural History Society; of the New York | Lyceum of Natural History; of the Natural History | Society of Montreal, etc., etc. | 1853 to 1855. | — | Philadelphia: | J. B. Lippincott & Co. | 1856. [1 vol. large 8vo size, 4to by sigs. viii, 298 p, 50 pl].

This has been described by Coues in his "List of Faunal Publications relative to North American Ornithology" (1878). It was "issued in 10 'parts,' with continuous pagination, during the years specified; collected in 1 vol. in 1856, with preface, contents, and index, forming the 'first series' of a work discontinued at this point. Text technical, descriptive, biographical (from field-notes of various correspondents, especially G. A. McCall and A. L. Heermann), and general. 50 spp. described and figured in colors; besides which all the then known North American species of *Parinæ*, [*Vulturidæ*,] *Falconidæ*, *Strigidæ*, and *Fissirostres* are systematically treated in the 'General Synopsis', interpolated at pp. 17-20, [56-62], 85-120, 175-197, 235-256. New species are:—*Falco nigriceps*, p. 87 (Dec., 1853); *Falco polyagrus*, pp. 88, 121, pl. 16; *Buteo insignatus*, pp. 102, 198, pl. 31 (March, 1854)".

3.

Ornithology of the United States and British and Russian America.
In United States Magazine, 1856-1857, viz: iii, 18-29; iii, 109-114; iii, 205-207; iii, 481-484; iv, 10-14.

This, like the first venture of Mr. Cassin, was soon abandoned, the Turkey Buzzards and Falconids alone having been treated of. Coues did not mention the fifth instalment of the series and was mistaken in supposing that "in consequence of the suspension of the *Magazine,* the contemplated series of articles was discontinued with the fourth instalment." The matter consists of a general popular, but strictly scientific, account of the *Carhartidæ* and *Falconidæ.*

4.

United States | Exploring Expedition. | During the years | 1838, 1839, 1840, 1841, 1842. | Under the command of | Charles Wilkes, U. S. N. | — | Mammalogy | and | Ornithology. | By John Cassin, | [etc.] | With a folio Atlas. | — | Philadelphia: | John B. Lippincott & Co. | 1858. [Text, 4to viii, 466 p. Atlas, fol. 53 pl.—Mammalogy, p. 1-66, 421-425; Ornithology, p. 67-416, 427-552.]

"In 1851," says Mr. Cassin, "I was engaged by the Honorable Joint Committee of Congress to superintend the preparation of Plates for the Atlas of Mammology and Ornithology of the United States Exploring Expedition, and subsequently to prepare the present volume."

5.

Cassin also assisted in the preparation of three other independent works. He co-operated with Spencer F. Baird, Charles Girard and S. S. Haldemann in the composition of "Outlines of General Zoology," (1851,) which originally formed part of a more general work, viz:

"Iconographic Encyclopædia of Science, Literature and Art, systematically arranged by John G. Heck, translated from the German with additions, and edited by Spencer F. Baird."

It was published by Rudolph Garrigue of New York in 1851. The part relative to "Vertebrata, class iii, Aves. Birds" was solely by Cassin and extended from p. 290 to p. 391 and plates 91 to 105. The classification was most like that of Vigors and Swainson. Cassin was "disposed to look upon the circular or quinary system of Vigors and Swainson as the first approximation to the natural system, and in all respects the most philosophical" (p. 291). All the authors of the Outlines except Cassin commenced with the lowest forms, but Cassin insisted on beginning with the "Accipitres".

6.

He also contributed, in 1855, a report on the ornithology of a government expedition, viz:

United States Naval Astronomical Expedition to the Southern Hemisphere during the years 1849, '50, '51, '52, (4to).

This report was headed "BIRDS. | By J. Cassin. | "and covered pp. 172-206 and pl. 14-28 of the second volume; the plates were well drawn and colored. No new species were made known.

7.

33d Congress, 2d Session. House of Representatives. Ex. Doc. No. 91. | — | Reports | of | Explorations and Surveys, | to | ascertain the most practicable and economical route for a railroad | from the | Mississippi River to the Pacific Ocean. | Made under the direction of the Secretary of War, in | 1853-6, | according to Acts of Congress of March 3, 1853, May 31, 1854, and August 5, 1854. | — | Volume IX. | — | Washington: | A. O. P. Nicholson, printer. | 1858. [Subtitled as follows: Explorations and Surveys for a railroad route from the Mississippi River to the Pacific Ocean. | War Department. | — | Birds: | by Spencer F. Baird, | Assistant Secretary Smithsonian Institution. | With the co-operation of | John Cassin and George N. Lawrence. | — | Washington, D. C. | 1858. 4to. i-lvi, 1-1005 pp. No illustrations.]

Another edition (from the same type) was headed "Senate, Ex. Doc. No. 78" and printed by Beverly Tucker.

Mr. Cassin has furnished the entire account of the Raptores, from p. 4 to 64, of the Grallæ from p. 689 to 753, and of the Alcidæ from p. 900 to 918, in all about 135 pages.

In 1860 the text of this was republished from the same stereotype plates with the following title.

The Birds | of | North America; | the description of species based chiefly on the collections | in the | Museum of the Smithsonian Institution. | By | Spencer F. Baird, | Assistant Secretary of the Smithsonian Institution, | with the co-operation of | John Cassin, | of the Academy of Natural Sciences of Philadelphia, | and | George N. Lawrence, | of the Lyceum of Natural History of New York. | With an Atlas of One Hundred Plates. | Text. | — | Philadelphia: | J. B. Lippincott & Co. | 1860. [4to. 2 p. ll. (Title, Advt.), i-lvi, 1-1005 pp. Atlas, xi pp., 100 pll.]

Coues has well described it; it was "a reissue, retitled, of vol. ix, *Pacific Railroad Reports*, 1858, *q. v.* The main text is identical, apparently from the same plates; and so the preliminary matter seems to be, excepting new Title, Advt., Explanation of Plates (pp. vii-xii), and Systematic List of Illustrations (pp. xiii-xv).—*Helminthophaga virginiæ*, p. xi (pl. 70, f. 1), sp. n. The Atlas consists of 100 pll., about half of which are new, the remainder being from the *Pacific Railroad Reports* and *Mexican Boundary Survey*, retouched and relettered, in some cases redrawn, for the edition."

8

We are indebted to Mr. Witmer Stone for the portrait of Cassin in the present number of THE OSPREY and which originally appeared in *Cassinia*.

we add to this the great differences in the range of markings and color, even in a single individual, and the great differences between the summer and winter habitats, the lengths of migration and the difficulty often experienced in getting suitable molting material, we are not surprised that the fallacy of a color change in a dead structure should have taken such a hold and have been so vigorously supported. One by one the facts brought forward to support the theory have been shown to be due to the other causes, so that few to-day accept the theory of color change in birds without a molt.

CHAPTER II.*

GENERAL ANATOMY.

What is known at the present time of the anatomy of birds would, if collected together, fill a considerable number of volumes, while what we have yet to learn in this field of research would furnish sufficient material that, if printed, would indeed make quite a library. From this the reader will appreciate the fact that to condense the knowledge we possess today on this subject into a few pages, the resulting contribution must obviously form but the merest outline or sketch of this department in the biology of *Aves*. This then must largely be the nature of the present chapter, though it is believed that even in so limited space the beginner may gain some idea of at least the rudiments of avian anatomy, while, on the other hand, a word to the wise is often sufficient.

As in the case of all other organized forms, birds have an anatomy, a characteristic structure,—in other words a definite anatomical structure,—often referred to as their morphology or morphological structure. Avian anatomy or avian morphology, then, takes into consideration the structure of birds, and it may be studied in a variety of ways. In the first place we may study the structure of some single species of the class, confining our researches to it alone, as has often been done in the case of man; in the second place we may investigate the anatomy of all the species of some particular genus, or family, or suborder or other group, and compare their characters *inter se;* or, finally, we may take into consideration the morphology of all existing birds, as far as we have any knowledge of it, and contrast the comparable characters with the corresponding structures as they occur in the representatives of the other groups of vertebrated animals. This latter course will bring to light the fact that, notwithstanding the great morphological modifications we shall meet with and the diversity of structure that exists throughout the vertebrate series, which of course includes birds, an evident unity of plan and function prevails everywhere. Again we may confine ourselves to the morphology of the extinct forms of birds,—a field of research covered by avine palæontology. As applied to the group under consideration, we may, too, embrace only the study of the development of birds within and without the egg, a line of study open to the one who undertakes the embryology of birds and their developmental anatomy. In all of these various methods and ways, certain systems alone may be investigated, as the osseous system, constituting the osteology of birds; or the muscular system, or their myology; the nervous system, or neurology, and so on for the vascular, the urogenital, digestive, and several other systems. Some students of the class resort to drawing a hard and fast line between the external or topographical anatomy of a bird and what they please to term *the* anatomy, or the structure of all of the rest of the organism. Such a division is established but for the sake of convenience, and has no real existence in nature, as, for example, the integumentary system and its appendages have quite as much to do with a bird's anatomy as the study of the structure of any of its internal systems or the organs of special sense, as those of the ear, eye, and others. In the taxonomy or classification of birds, their anatomy constitutes our main reliance, in fact it is through the structure of birds alone that we can come to a correct knowledge of their affinities; place in the system; and their relations to each other, as well as the limitations of existing and extinct groups, from genus to order.

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*The chapter on the Anatomy of Birds is by Dr. R. W. Shufeldt.

For one to successfully pursue the anatomy of birds as complete a mastery as possible must be made of a, by no means inextensive glossary now a part of the science; it requires a more or less complete appreciation and understanding of the laws of organic evolution and development; that the latter may mean the developmental history of the class (*phylogeny*), or that of the individual (*ontogeny*). These last are extremely important. Structures must likewise be studied in the light of their being *analogous* or *homologous;* homology being the true resemblance between parts that are morphologically and often functionally alike, while *analogy* means that these resemblances are only apparent. The wing of a bird and the fore leg of a mammal are homologically the same, while the wing of a bird and that of a bee are but analogically in agreement.

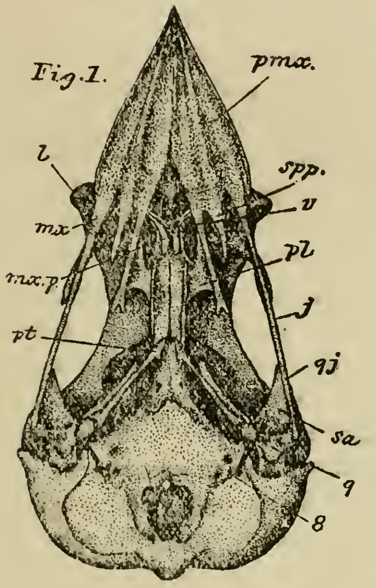
We say that the homologies are *general* when the comparisons are restricted to a single individual, and they are *serially homologous* structures or organs when the same, though not essentially exact, representations of each other. The ribs and the vertebræ are thus classed. Homologies again, or homodynamous organs, may be complete or incomplete; for example, the femur of a bird and the femur of a squirrel are homologically complete, but this is not the case when we come to compare the entire leg of a bird with the entire hind leg of a squirrel,—the homology is then incomplete. There are other terms, used technically, that occur throughout the entire science of descriptive anatomy: thus, the spinal or vertebral column is considered to be the longitudinal axis of the bird's body, its *cephalic* extremity bearing the head, and its *caudal end*, the tail. So, too, there is an anterior half of the body, a posterior half, and the two lateral halves. In the latter, as a rule, there are corresponding parts throughout, while in the former some structures only, are serially anologous, being comparisons confined principally to the limbs and the skeletal girdles supporting them. Anterior and posterior may also be used *relatively* in describing the same structure or any part of it, as the anterior and posterior part of the skull, or any charcter of the same may be anterior or posterior to any other character. In much the same manner we employ the terms *distal* and *proximal*, in a relative sense as being near or remote from the imaginary centre of the body. The distal extremity of the humerus articulates with the bones of the forearm, while its proximal end is in the glenoid fossa. The manus is the distal division of the pectoral limb and is *distad* to its *proximad* division, which is composed of the humerus. The *basal* part of an organ or structure is generally its proximal part, as the base of the heart; the base of the skull. On the other hand the *apex*, or apical end is usually the tip or distal extremity, as the *apex* of the beak; the apex of the heart or lungs. Aspects of a part or organ relatively corresponding to the back or the belly sides are designated respectively as *dorsal* and *ventral;* they find their explanation in the fact that the heart, lungs, and digestive organs are upon the ventral side of the spinal column, in contradistinction to the structures found *dorsad* or upon the opposite aspect. *Ventrad* upon the sternum we find the keel. In our descriptions an imaginary plane is supposed to pass through the *longitudinal axis;* it is at right angles to the *transverse axis.* With reference to this plane, parts of structures, characters and so forth, may, relatively speaking, be inner or *median,* outer or *lateral.* The *lateral* aspect of the skull sometimes conceals those parts situated *mesiad* to them.

The topographical anatomy of a bird is, of itself, an extensive subject, and demands the employment of a large number of technical terms in its description. In the first place birds are the only vertebrates possessing feathers, and the anatomy of these integumentary structures alone offers a wide field for study. In their entirety they constitute the plumage of a bird or its *ptilosis.* Their peculiar development has been fully described by many writers while the science of *pterylography*, or the various arrangements or implantations of the feathers upon the skin, has for a long time been employed as an important factor in classification. A bird's body, again, is divided into various parts for the purpose of description, as the head, the neck, the trunk, the mandibles, wings, tail, and feet, and these parts have, by descriptive ornithologists, been divided up into certain regions, areas, and special characters in great detail. In fact the description of the topographical anatomy of the exterior of an ordinary bird would occupy far more space than the writer has at his command in this place, and to give the barest sketch of our present knowledge of this subject would demand many pages.

Morphological or anatomical descriptions of the mandibles of different species of birds in the world, their feet, external anatomy of the eye and ear, special growths and variations of parts, wattles, and the general development of the ptilosis would furnish material for a small volume. Some of these structures will be briefly referred to again further on, but for the present the skeleton will be first considered, after which a short account will be given of the other systems of a bird's anatomy.

THE SKELETON.

To gain a complete understanding of the skeleton of a bird, one should study its development in the chick, and follow it through its various stages to the adult. This applies particularly to the skull, which is made up of various bones that are for the most part only separate in early life, being as a rule largely fused together when the individual comes to maturity. This process is more or less tardy in the ostrich-like birds, but in them, as in all other members of the class, the skeleton is conveniently divided for the purposes of study into the skull; the skeleton of the trunk or body; the skeleton of the limbs or members; and finally, any special ossifications. Another not unusual division is that of the *axial skeleton* and the *appendicular skeleton*, the first including the skull and trunk, and the latter the limbs. In the study of birds, a knowledge of the anatomy of the skeleton is of the utmost importance. It is not only the framework of the bird itself, but is likewise the framework of the science of ornithology. To avian anatomy it is what the frame is to a house or a ship, for to it are attached all the other parts of the structure, or within it are harbored the organs and the vital machinery. In a natural classification of birds, a knowledge of the skeleton is absolutely essential as it furnishes the majority of characters having taxonomic value. Of all parts of the skeleton, no portion possesses the importance and interest that the skull does,—that beautifully fashioned object in bone, that not only in birds, but throughout the vertebrata, has been one of the knottiest problems the morphologist has had to solve. But there is a rich literature upon the subject now, and ever ready at the student's hand. An easy skull to study is that of the common fowl, for much has been written upon it. In this type, at the end of the first year of its existence, it has passed through all the embryonic and subadult stages, and we find the skull to have arrived at a stage that it will practically have throughout the life of the individual. This also applies to the rest of the skeleton.



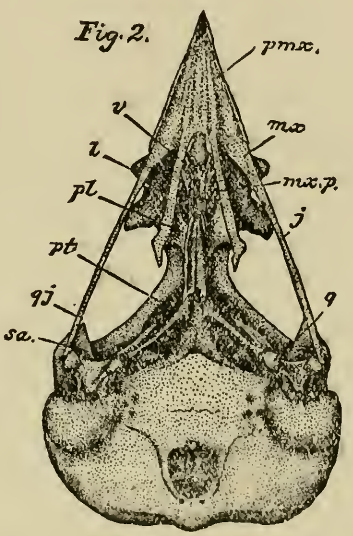


Fig. 1. Basal view of the skull of Black-headed Grosbeak (*Habia melanocephala*) ad., ♂; x 2. Mandible removed.

Fig. 2. Basal view of the skull of Spurred Towhee (*Pipilo m. megalonyx*), ad., ♂; x 2. Mandible removed.

EXPLANATION OF LETTERING.

pmx., premaxillary; *l.*, lachrymal; *mx.*, maxillary; *mx. p.*, maxillopalatine; *pt.*, pterygoid; *spp.*, secondary palatine process; *v.*, vomer; *pl.*, palatine; *j.*, jugal; *sa.*, squamosal process; *q.*, quadrate; 8, foramen for glossopharyngeal and vagus nerves; *qj.*, quadratojugal.

A general examination of the skull reveals to us the fact that in the subadult individual it is composed of a number of separate parts, chief of which is the cranium proper, to which are attached, anteriorly, the bones of the face. Other elements at the base of cranium are free, as the quadrates and pterygoids. Then there is the *mandible* or lower jaw, whichis always a free bone. Next we have the bony framework of the tongue or the hyoidean apparatus; the small bones found in the middle ear; and the circlet of ossifications found in either eye, termed the *sclerotal plates.* Often there are additional ossifications, as the supraorbital bones in the diurnal raptores; the nuchal style in the cormorants; and not a few others. Frequently too, the lacrymal bones are not united to the skull.

This is the case of the common fowl wherein we often find the premaxillary, the nasals and the vomer independent bones; the latter, when it ossifies, invariably so. The larger and posterior part of the skull fuses into one piece, designated as the cranium, the bones composing it entering into the formation of the brain-case, or brain-casket, it being the osseous box in which the brain is enclosed, and by which it is protected. At the base of the cranium upon either side, there are also found the ear-cavities. Either of these offers a conspicuous entrance below the squamosal bone while in front of the opening we meet with the *quadrate bone,* a freely articulated segment that stands between the cranium above, and the articular cup intended for its reception at the free posterior extremity of either limb of the lower jaw, or mandible, below. From either quadrate there passes forward a slender bar,—the quadrato-jugal bar—that has a free articulation with the quadrate, but anteriorly is wedged in between the nasal and the premaxillary. It is composed of three separate elements, and it bounds the cavity of the orbit beneath. This latter cavity is separated from its fellow of the opposite side, by a bony partition called the interorbital septum, largely composed of the mesethmoid. In many birds the cavity of an orbit and the nasal or rhinal cavity in front of the former, are more or less completely separated by the ethmoidal lateral wings, known as the *pars plana* on either side, while the turbinal bones of the nasal chamber often ossify to a greater or less extent. They hardly do at all in the fowl where all that part of the skull is very open and exposed in the dried adult preparation, though in other birds, as in the Parrots and Falcons, the very reverse of this state of things obtains.

In the fowls we note what corresponds in other vertebrates to the external openings of the nostrils—the external narial apertures,—are large and oval in outline, their curves being continued to include the free anterior margins of the nasal bones. When this is the case the bird's skull is said to be "holorhinal". In some forms, however, the curve is broken as it comes to the nasal bone, which latter exhibits a cleft or fissure;—such skulls being termed "schizo-rhinal", and birds possessing them, schizorhinous. By some anatomists this character has been used in classification, where in many instances too much significance has been attached to it. The upper bill or beak of a bird, technically termed its superior osseous mandible, is, for its entire anterior portion, formed by the premaxillary bone. This is one of the most interesting elements of the skull, and is a bone that occurs in the skulls of every form

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